



# CITY OF HOUSTON

Administration and Regulatory Affairs Department  
**Strategic Purchasing Division**

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December 13, 2010

Subject: Letter of Clarification No. 4 to Invitation to Bid No. S12-N23798 for Pumps, Various Types & Sizes for the Public Works and Engineering Department.

To: All Prospective Bidders:

This letter of Clarification is being issued for the following reasons:

**1) To revise the specifications and respond to question posed by prospective bidders:**

- **SECTION B, entitled TECHNICAL SPECIFICATIONS is hereby changed as follows:**

1. Remove pages 7, 8, 10 thru 12, 15, 16, 21, 22, 24, 27 thru 29, 30, 33, 35, 36, 38, 39, 43, 45, 46, 48, thru 54, and 57 of 76 and replace with the attached pages 7, 8, 10 thru 12, 15, 16, 21, 22, 24, 27 thru 29, 33, 35, 36, 38, 39, 45, 46, 48, 50 thru 54, and 57 of 76 marked "*Revised 12/13/2010*".

- **The following is the question posed by a prospective bidder and the answer thereto:**

**Question #1** "Are the item descriptions and quantities listed on the electronic bid?"

**Answer:** Yes, the electronic bid form contains pump descriptions and the requested quantities.

**Note: No further questions will be accepted after the publication of this Letter of Clarification.**

When issued, Letter(s) of Clarification shall automatically become a part of the bid documents and shall supersede any previous specification(s) and/or provision(s) in conflict with the Letter(s) of Clarification. It is the responsibility of the bidders to ensure that it has obtained all such letter(s). By submitting a bid on this project, bidders shall be deemed to have received all Letter(s) of Clarification and to have incorporated them into this solicitation.

Furthermore, it is the responsibility of each Contractor to obtain any previous Letter of Clarification associated with this solicitation.

  
Martin L. King  
Senior Staff Analyst  
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Attachments: (1) Pages 7, 8, 10 thru 12, 15, 16, 21, 22, 24, 27 thru 29, 30, 33, 35, 36, 38, 39, 43, 45, 46, 48 thru 54, and 57 of 76 marked "*Revised 12/13/2010*"

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**SECTION B**  
**PART II - TECHNICAL SPECIFICATIONS**  
**FOR**  
**PUMPS, VARIOUS TYPES & SIZES**

***REVISED 12/13/2010***

**1.0 SCOPE:**

The intent of these specifications is for the successful bidder/offer to furnish and deliver, FOB destination, each pump specified herein in strict accordance with the specifications.

**1.0.1** If the bidder elects to offer a pump that is not the referenced manufacturer's product, including the serial/model numbers as specified in the electronic bid form and these technical specifications, the bidder "must" provide documentation with its bid which shows the name of the manufacturer, product name, product serial/model numbers and detailed specifications, of the pump bid, including applicable warranty information, which shall not be less than the warranty specified. There will be no cost to the City for retrofitting alternative pumps.

**1.0.2** **Note:** If the bidder/supplier offers to supply a pump which different than the referenced/recommended manufacturer, the bidder/supplier shall be required to install and wire unit(s) bid at the unit price bid.

**1.1 PUMP TYPES/SIZES:**

**1.1.1 GROUP I - Bid Line Item No. 1**

Pump, Submersible, 270HP De-Rated from 280HP, 100 Cable, 1240 impeller, 18,330 GPM @ 45' TDH, w/86% efficiency, Size: 24". Referenced Manufacturer: Flygt Corporation, Model No. CP-3602X.

**1.1.2 GROUP I - Bid Line Item No. 2**

Pump, Submersible, 450HP De-Rated from 500HP, 100 Cable, 1040 impeller, 24,500 GPM @ 61.5' TDH, w/84% efficiency, 10 Pole, Size: 24". Referenced Manufacturer: Flygt Corporation, Model No. CP-3602X.

**1.1.3 GROUP I - Bid Line Item No. 3**

Pump, Submersible, 135HP, 100 Cable, 460 Volt, 10,000 GPM @ 39.5' TDH, Size: 36" Discharge Tube. Referenced Manufacturer: ITT Flygt Corporation, Model No. LL-3400.

**1.1.4 GROUP I - Bid Line Item No. 4**

Pump, Submersible, 250HP, 60 Cable, 460 Volt, 27,000 GPM @ 19' TDH, Size: 48" Discharge Tube. Referenced Manufacturer: ITT Flygt Corporation, Model No. PL-7081.

**1.1.5 GROUP I - Bid Line Item No. 5**

Pump, Submersible, 45HP, 60 Cable, 460 Volt, 4,000 GPM @ 34.8' TDH w/79.9% efficiency, Size: 12". Referenced Manufacturer: ITT Flygt Corporation, Model No. NT-3202.

**1.1.6 GROUP I - Bid Line Item No. 6**

Pump, Submersible, 11HP, 3450 RPM, 150GPM @ 77' TDH, Size: 2". Referenced Manufacturer: Flygt Corporation, Model No. MP-3127X.

**1.1.7 GROUP II - Bid Line Item No. 7**

Pump, Dry Pit, 25HP, 1800RPM, 695 GPM @ 78.5' Size: 6". Referenced Manufacturer: ITT A-C, Model No. NSWV 300.

**1.1.8 GROUP II - Bid Line Item No. 8**

Pump, Abrasive Sludge, 25HP, 695 GPM @ 78.5' Size: 6". Referenced Manufacturer: ITT Goulds, Model No. JC.

**1.1.9 GROUP II - Bid Line Item No. 9**

Pump, Abrasive Sludge, 10HP, 880RPM, Size: 4". Referenced Manufacturer: ITT Goulds, Model No. HSD.

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- 1.1.10 GROUP III - Bid Line Item No. 10  
Pump, Vertical Dry Pit, 30 HP, 480V, 870 RPM, Size: 10". Referenced Manufacturer: Chicago Yeomans Pump, Model No. VPM-OLC10.
- 1.1.11 GROUP III - Bid Line Item No. 11  
Pump, Wasting, 7.5 HP, 480V, 1,750 RPM, 300 GPM @ 38.3' TDH Size: 4". Referenced Manufacturer: Chicago Pump Series 2110, Model No. LMC4.
- 1.1.12 GROUP III - Bid Line Item No. 12  
Pump, Horizontal Bare, 7.5 HP, 875 RPM, 30' TDH Size: 4". Referenced Manufacturer: Chicago Pump TSP, Model No. 4315SC-3D.
- 1.1.13 GROUP IV - Bid Line Item No. 13  
Pump, Centrifugal, 250-850 GPM @ 33-67' TDH, 40 HP, 1,157 RPM with 213TC Frame, 6" Size. Referenced Manufacturer: Vaughan Chopper Pump, Model No. HE4P6S-118 DSP.
- 1.1.14 GROUP V - Bid Line Item No. 14  
Pump, Submersible, 95 HP, Referenced Manufacturer: KSB, Model No. Model No. KRTUK 350-460/458 or City approved equal.
- 1.1.15 GROUP V - Bid Line Item No. 15**  
**Pump, Submersible, 153 HP, 8,000 GPM. Referenced Manufacturer: KSB, Model No. Model No. KRTUK 350-500/758 or City approved equal.**
- 1.1.16 GROUP V - Bid Line Item No. 16**  
**Pump, Submersible, 80 HP, 20,000 GPM @ 20' TDH, 65' Shut Off Head. Referenced Manufacturer: KSB, Model No. Model No. KRTUK 500-520/4512 or City approved equal.**
- 1.1.17 GROUP V - Bid Line Item No. 17  
Pump, Submersible, 34 HP, Referenced Manufacturer: KSB, Model No. Model No. KRTUK 15-315/184 or City approved equal.
- 1.1.18 GROUP V - Bid Line Item No. 18**  
**Pump, Submersible, 330 HP, 21,800 GPM @ 37.9' TDH, 45.9' Shutoff. Referenced Manufacturer: KSB, Model No. Model No. KRTUK 600-710/16012 or City approved equal.**
- 1.1.19 GROUP V - Bid Line Item No. 19**  
**Pump, Submersible, 80 HP, 3,060 GPM @ 60.5' TDH. Referenced Manufacturer: KSB, Model No. Model No. KRTUK 250-370/306 or City approved equal.**
- 1.1.20 GROUP V - Bid Line Item No. 20**  
**Pump, Submersible, 20 HP, 2,500 GPM. Referenced Manufacturer: KSB, Model No. Model No. KRTUK 100-251/164XG or City approved equal.**
- 1.1.21 GROUP VI - Bid Line Item No. 21  
Pump, Sludge Pump, 15HP, 400 GPM @ 880 RPM. Referenced Manufacturer: Fairbanks Morse Pump, ITT A-C Series, NSW, , 4X4X14, Model No. 998425-0 TSP or City approved equal.
- 1.1.22 GROUP VII - Bid Line Item No. 22  
Pump, 18HP, 1800 RPM, 250 GPM @ 61.5' TDH, 1800 RPM. Referenced Manufacturer Fibroc Pump, Series 1500 or City approved equal.
- 1.1.23 GROUP VIII - Bid Line Item No. 23  
Pump, Thickened Sludge, 6" Referenced Manufacturer: Netzsch Pump, Model No. NM076SY01L04K or City approved equal.
- 1.1.24 GROUP IX - Bid Line Item No. 24**  
**Pump, Sewage, 5HP @ 1150 RPM, 545 GPM @ 14-10' TDH, Referenced Manufacturer: PACO, No base, Model No. 52-49513 or City approved equal.**

3.0 GROUP I- BID LINE ITEM NOS. 1 and 2: PUMP, 24" SUBMERSIBLE:

**Furnish 24" Submersible non-clog wastewater pump(s) capable of handling raw unscreened sewage.**

**3.01 The pumps supplied shall be direct replacements for the existing pumps at the Clinton Drive Lift Station. No modifications to the facility structure, mechanical features, electrical or controls shall be allowed. Only guide rail systems allowed.**

**3.02 Item 1: pump capacity 18,330 gpm @ 45 feet head, minimum efficiency 85.9%, discharge 24-inch, 460 volt, and minimum 100 feet of cable.**

**3.03 Item 2: pump capacity 24,500 gpm @ 61.5 feet head, minimum efficiency 83.9%, discharge 24-inch, 460 volt.**

3.1 REFERENCE STANDARDS:

Comply as a minimum with applicable provisions and recommendations of the following:

- 3.1.1 American National Standards Institute (ANSI)
- 3.1.2 American Society for Testing and Materials (ASTM)
- 3.1.3 Anti-Friction Bearing Manufacturers Association (AFBMA)
- 3.1.4 Hydraulic Institute.
- 3.1.5 Institute of Electrical and Electronic Engineers (IEEE)
- 3.1.6 National Electric Code (NEC)
- 3.1.7 National Electrical Manufacturers Association (NEMA)
- 3.1.8 Steel Structures Painting Council (SSPC)

**3.2 Pumps shall be designed for continuous operation without cavitations within the specified operating range. The pump shall have a minimum hydraulic efficiency of 85.9 percent for item 1 and 83.9 percent for item 2 both at the rated capacity. The NPSHR at the maximum operating capacity shall not exceed 30 feet.**

3.3 Deliver equipment to the City's Cullen facility.

3.3.1 The City will store all equipment after delivery.

3.3.2 The pump cable end shall be sealed with a high quality protective covering to make it impervious to moisture or water seepage from submersion or other causes prior to electrical installation. Power and control cables shall match the cables on the existing pumps.

3.4 ACCEPTABLE MANUFACTURERS

3.4.1 Through shop drawing submittals, the following named manufacturers will be considered, provided the submitted equipment meets the specified requirements and system operating conditions:

- Flygt Pumps, Inc.
- KSB Pumps, Inc.
- **City of Houston Approved Equal.**

3.5 PUMP CONSTRUCTION

3.5.1 Major pump components shall be of fine grained gray cast iron, ASTM A48, Class 35B or better, with smooth surfaces devoid of blow holes and other irregularities. Surfaces coming into contact with sewage, other than stainless steel shall be protected by an approved sewage resistant coating. All exposed nuts or bolts shall be AISI type 304 stainless steel.

3.5.2 Mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber o-rings. Fitting shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces. This will result in controlled compression of nitrile rubber o-rings without the requirement of a specific torque limit. No secondary sealing compounds, rectangular gaskets, elliptical o-rings, grease or other devices shall be used.

3.5.3 Pump suction flange shall be drilled to ANSI standard, class 125.

### 3.6 POWER CABLE

3.6.1 All Power and control cables shall be 100 feet minimum. The cable entry water seal design shall preclude specific torque requirements to ensure a watertight and submersible seal. The cable entry shall be sealed by an elastomer grommet, epoxy potting material, or a combination of both. The cable entry sealing system shall provide strain relief for the terminal connections and allow access to the terminal connections without adversely affecting the integrity or function of the seal system.

3.6.2 Cables shall be oil, grease and abrasion resistant, and meet applicable standards. The outer jacket shall be polyurethane or other material equally suitable for immersion in wastewater.

3.6.3 **Cables shall be capable of operating on 480 volt, 3 phase service and under continuous submergence without loss of watertight integrity to a depth of 65 feet.**

3.6.4 **No parallel power cables are acceptable unless they are size #1/0 or larger.**

3.6.5 The pilot cable shall be designed specifically for use with submersible pumps and shall be type SUBCAB (Submersible Cable). The cable shall be multi-conductor type with stainless steel braided shielding, a chlorinated polyethylene rubber outer jacket and tinned copper conductors insulated with ethylene-propylene rubber. The conductors shall be arranged in twisted pairs. The cable shall be rated for 600 Volts and 90°C (194°F) with a 40°C (104°F) ambient temperature and shall be approved by Factory Mutual (FM). The cable length shall be adequate to reach the junction box without the need for splices.

### 3.7 MOTOR

3.7.1 Motors shall have reconnectable terminal blocks. AH leads shall be numbered.

3.7.2 The pump motor shall be a NEMA Design B squirrel-cage, induction, shell type design, housed in an oil-filled or air-filled watertight chamber. The stator winding and stator leads shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing shall be rejected. The rotor bars and short circuit rings shall be of aluminum. The motor shall be designed for continuous duty, capable of sustaining a minimum of 8 starts per hour, evenly spaced. The pump/motor shall be capable of operating at liquid temperature of 104 degrees F per FM requirements-without overheating or operating in the service factor. Motor shall be non-overloading over the entire range of the operating curve within the nameplate HP. A performance chart shall be provided showing curves for torque, current, a minimum service factor of 1.15, input/output kw and efficiency.

- 3.7.3 Thermal switches shall be embedded in the stator end coils to monitor the temperature of each phase winding. One PT-100 type temperature sensor shall be installed in the stator winding, to allow reading actual motor temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables. A pump memory module shall be provided and mounted in the pump junction chamber and be capable of recording pump run time, number of starts as well as contain the motor unit performance and manufacturing data and service history. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.
- 3.7.4 The motor shall be UL listed or FM approved as explosion-proof, suitable for NEC Class I, Division 1, Group C and D environments.
- 3.7.5 Each unit shall be provided with an adequately designed cooling system totally self-contained with no external mechanical devices. Pumps shall be designed to operate continuously with the fluid level at the top of the pump volute.
- 3.7.6 **Maximum motor speed shall be 590 rpm**
- 3.7.7 Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with 3 thermal switches, embedded in the end coils of the stator winding (one switch in each stator phase). These shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.
- 3.7.8 For motor sizes larger than 100 HP, an independent thermal switch shall be included to monitor the lower motor bearing temperature.
- 3.7.9 Motors larger than 20 HP shall be equipped with a leakage sensor to detect water in the stator chamber.
- 3.7.10 Each pump/motor unit shall be provided with an integral, self-supplying cooling system. The motor water jacket shall encircle the stator housing and shall be of cast iron, ASTM A-48, Class 35B. The water jacket shall thus provide heat dissipation for the motor regardless of whether the motor unit is submerged in the pumped media or surrounded by air. After passing through a classifying labyrinth, the impeller back vanes shall provide the necessary circulation of the cooling liquid, a portion of the filtered pump media, through the cooling system. Two cooling liquid supply pipes, one discharging low and one discharging high within the jacket, shall supply the cooling liquid to the jacket. An air evacuation tube shall be provided to facilitate air removal from within the jacket. Any piping internal to the cooling system shall be shielded from the cooling media flow allowing for unobstructed circular flow within the jacket about the stator housing. Two cooling liquid return ports shall be provided. The internals to the cooling system shall be non-clogging by virtue of their dimensions. Drilled and threaded provisions for external cooling and, seal flushing or air relief are to be provided. The cooling jacket shall be equipped with two flanged, gasketed and bolted inspection ports of not less than 4"Ø located 180° apart. The cooling system shall provide for continuous submerged or completely non-submerged pump operation in liquid or in air having a temperature of up to 40°C (104°F), in accordance with NEMA standards. Restrictions limiting the ambient or liquid temperatures at levels less than 40°C are not acceptable.

3.14 SHOP PAINTING

- 3.14.1 Pump motor size greater than 100 HP.
- 3.14.2 Pre-treatment. Abrasive blast cleaning and removal of all oil and dust.
- 3.14.3 Primer. One coat of acrylic dispersion zinc phosphate primer, 1.6 mils minimum.
- 3.14.4 Finish Polyester resin paint, 2.4 mils minimum.
- 3.14.5 Machine finished surfaces:
- 3.14.6 Machined parts are cleaned to remove all dirt and grease.
- 3.14.7 Cleaning is done so as not to affect primer or deteriorate adherence to finish paint.
- 3.14.8 Storage and transport is carried out in such a way that rust-attack on machined surfaces does not occur,
- 3.14.9 At assembly, surfaces are coated with a corrosion preventive paint.

3.15 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

3.16 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

3.17 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 120 calendar days after receipt of a City of Houston Purchase Order.**

3.18 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

**4.0 GROUP I-BID LINE ITEM NO. 3: PUMP, SUBMERSIBLE:**

**Furnish submersible non-clog vertical mixed flow pump(s) discharging through a 36-inch tube.**

4.1 Pump should be capable of delivering 10,000 GPM at 39.5 ft. TDH. An additional point on the same curve shall be 13,500 GPM at 15 ft. TDH. Pump shut off head shall be no less than 55 feet. Each pump shall be equipped with 55 Ft. SS Cable. The working load of the lifting system shall be 50% greater than the pump unit weight.

4.2 The specification is for electric submersible pump(s) to be supplied with motor, cast iron housing, power cable and accessories. The pumps are normally installed within a vertical tube.

**4.3 QUALITY ASSURANCE**

The pump(s) shall be heavy duty, electric submersible, centrifugal non-clog units designed for handling raw, unscreened sewage and wastewater and shall be fully guaranteed for this use. The pumps provided shall be capable of operating in a liquid temperature up to 104 DEGREES F. Since the high temperature of 104 DEGREES F is specified by the National Electrical Manufacturers Association (NEMA) and Factory Mutual (FM), motors operating below 104 DEGREES F shall not be acceptable.

4.4 The pump and motor unit shall be suitable for continuous operation at full nameplate load while the motor is completely submerged, partially submerged or totally non-submerged. The use of shower systems, secondary pumps or cooling fans to cool the motor shall not be acceptable.

4.5 The pump, mechanical seals and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.

**4.6 SUBMITTALS**

Submittal data shall be provided to show compliance with these specifications, plans or other specifications that will influence the proper operation of the pump(s).

4.6.1 Standard submittal data for approval must consist of:

- Performance Curves.
- Pump Outline Drawing.
- Station Drawing for Accessories.
- Detailed Electrical Data.
- Technical Manuals.
- Parts List.
- Printed Warranty.
- Manufacturer's Equipment Storage Recommendations.
- Lack of the above requested submittal data is cause for rejection.

**4.7 TESTING**

Testing performed upon each pump shall include the following inspections:

4.7.1 Impeller, motor rating and electrical connections shall be checked for compliance with this specification.

4.7.2 Prior to submergence, each pump shall be run dry to establish correct rotation.

4.7.3 Each pump shall be run submerged in water.

4.7.4 Motor and cable insulation shall be tested for moisture content or insulation defects.

4.7.5 Upon request, a written quality assurance record confirming the above testing/inspections shall be supplied with each pump at the time of shipment.

4.7.6 The pump(s) shall be rejected if the above requirements are not satisfied.

4.28 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

4.29 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

4.30 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 120 calendar days after receipt of a City of Houston Purchase Order.**

4.31 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

5.0 **GROUP I-BID LINE ITEM NO. 4: PUMP, SUBMERSIBLE:**

**Furnish submersible non-clog vertical mixed flow pump(s) discharging through a 48-inch tube.**

- 5.28 Pump shall be electrically operated submersible propeller pump/motor unit(s). The pump/motor unit(s) shall be close coupled to form one integrated direct drive unit. The pump/motor unit shall be designed for installation into a discharge column onto a seat at the bottom of the column. The pump/motor unit shall be held in place by its own weight and the pumping head.
- 5.29 Each pump/motor unit, hereafter called pump(s) or unit(s), shall be equipped with a 250 HP, submersible electric motor connected for operation on a 460 volt, 3-phase, 60 Hertz, 4 wire service with 60 Ft. lengths of power and signal cable. Pump(s) shall be capable of delivering a minimum of 27,000 GPM at 19 feet TDH at a minimum overall efficiency of 74 %, and shall be able to supply flows of 24250 GPM minimum, at 24 ft. of head and 29500 GPM maximum, at 11 ft. of head and shall be non-overloading throughout the specified performance range. Pump discharges through a 48-inch tube. The NPSH required for any of the above design points shall not exceed 36ft. of water, when referenced to the lowest point on the pump bellmouth.
- 5.30 The pump(s) shall be heavy duty, electric submersible, centrifugal non-clog units designed for handling raw, unscreened sewage and wastewater and shall be fully guaranteed for this use. The pumps provided shall be capable of operating in an ambient liquid temperature of 104 DEGREES F. Since the high temperature of 104 DEGREES F is specified by the National Electrical Manufacturers Association (NEMA) and Factory Mutual (FM), motors with a maximum ambient temperature rating below 104 DEGREES F shall not be acceptable.
- 5.31 The pump and motor unit shall be suitable for continuous operation at full nameplate load while the motor is completely submerged, partially submerged or totally non-submerged. The use of shower systems, secondary pumps or cooling fans to cool the motor shall not be acceptable.
- 5.32 The pump, mechanical seals and motor units provided under this specification shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, manufacturer's service and warranty.
- 5.33 **SUBMITTALS**  
Submittal data shall be provided to show compliance with these specifications, plans or other specifications that will influence the proper operation of the pump(s).
- 5.6.1 Standard submittal data for approval must consist of:
- a. Pump Performance Curves.
  - b. Pump Outline Drawing.
  - c. Station Drawing for Accessories.
  - d. Detailed Electrical Data.
  - e. Control Drawing and Data.
  - f. Access Frame Drawing.
  - g. Typical Installation Guides.
  - h. Technical Manuals.
  - i. Parts List.
  - j. Printed Warranty.
  - k. Manufacturer's Equipment Storage Recommendations.
  - l. Manufacturer's Standard Recommended Start-Up Report Form.
  - m. Motor Performance Curve.
- 5.6.2 Lack of the above requested submittal data is cause for rejection.

5.34 **EXPLOSION-PROOF PUMPS (X): The pump system including the pump, motor and power cable shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class I, Div. 1, Group C and D service as determined and approved by a U.S. nationally recognized testing agency (U.L., FM) at the time of the bidding of the project. As required by Factory Mutual (FM) the motor shall be capable of operating in pumped media up to 104 DEGREES F. The motor thermal switch shall allow safe motor operation up to 260°F (125°C). In addition, an internal Float Switch shall be available, as an option, in the motor chamber. Service of explosion-proof submersible units shall be performed by qualified FM experienced personnel. The pump manufacturer must provide training schools to qualify personnel in the proper service and repair of explosion-proof pumps.**

5.35 PUMP DESIGN

The discharge column shall be permanently installed in the wet well. The design shall be such that the pump unit(s) will be automatically and firmly connected to the discharge tube when lowered into place. A locking device, located on the external surface of the pump housing, shall prohibit rotational movement of the pump/motor unit(s) within the tube(s). The pump(s) shall be easily removable for inspection or service with no need for personnel to enter the wet well. The pump(s) shall not require any bolts, nuts or fasteners for connection to the discharge column. Stiffening and guiding webs shall be provided at the pump support seat to ensure concentric positioning of pump within the discharge column. An O-ring shall be provided on the bottom of the inlet (suction) bellmouth so that the weight of the pump unit, when acting on the O-ring, will provide an effective seal between pump and discharge column.

5.36 POWER CABLES

The power cable shall be designed specifically for use with submersible pumps and shall be type SUBCAB (Submersible Cable). The cable shall be sized according to the National Electrical Code (NEC) and the Insulated Cable Engineers Association (ICEA). The outer jacket shall be lubricant resistant chlorinated polyethylene rubber, and the copper conductors shall be insulated with ethylene-propylene rubber (EPR). The filler and conductor separator materials shall be of non-wicking vulcanized rubber. The cable shall be rated for 600 volts and 90°C (194°F) with a 40°C (104°F) ambient temperature and shall be approved by Factory Mutual (FM). The cable length shall be adequate to reach the junction box without the need for splices.

5.37 PILOT CABLE

The pilot cable shall be designed specifically for use with submersible pumps and shall be type SUBCAB (Submersible Cable). The cable shall be multi-conductor type with stainless steel braided shielding, a chlorinated polyethylene rubber outer jacket and tinned copper conductors insulated with ethylene-propylene rubber. The conductors shall be arranged in twisted pairs. The cable shall be rated for 600 Volts and 90°C (194°F) with a 40°C (104°F) ambient temperature and shall be approved by Factory Mutual (FM). The cable length shall be adequate to reach the junction box without the need for splices.

5.38 CABLE PROTECTION AND SUSPENSION

Engineer approved cable protection and suspension system shall be provided on all installations with in-tube cable runs over 10 feet in length.

5.39 CABLE ENTRY

The cable entry water seal design shall preclude specific torque requirements and ensure a watertight and submersible seal. The cable entry shall be comprised of two cylindrical elastomer grommets, flanked by four stainless steel washers, a spacer ring and an O-ring; all having a close tolerance fit against the cable outside diameter and the cable entry inside diameter. This design shall combine the sealing function with the cable strain relief function so that when the cable entry is mounted onto the junction box, the cable entry will be 100% watertight during immersion of 65 feet or greater, while providing sufficient strain relief to prevent the cable from pulling out when handling, installing, or operating the pump. The assembly shall bear against a shoulder in the pump top and direct the cable axially upwards. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable for the cable entry and sealing system.

5.27.3 The solid-state pump memory unit, three thermal switches, two FLS switches, PT-100 stator temperature monitor and the lower bearing PT-100 temperature monitor shall all be connected to a MAS (Monitoring and Status) monitoring unit. The MAS shall be designed to be mounted in the control panel and shall come with an Operator Panel that is dead-front panel mounted. The Operator Panel shall have soft-touch operator keys and provide local indication of the status of the alarms within the connected pump unit by means of an LCD screen read-out. Local MAS system change shall be made by use of the soft-touch keypad or local connection by means of a laptop computer. Remote indication of pump unit status shall be possible with connection to customer PLC or via LAN.

5.28 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

5.29 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

5.30 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 120 calendar days after receipt of a City of Houston Purchase Order.**

5.31 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

6.0 GROUP I-BID LINE ITEM NO. 5: PUMP, 12” SUBMERSIBLE:  
Furnish 12” submersible pump(s).

6.1 DESIGN REQUIREMENTS

- 6.1.1 12 Inch Discharge
- 6.1.2 Electric Submersible Sewage Pump(s)
- 6.1.3 45 H.P, 460 Volt, 3 Phase, 60 Hertz, 1170 RPM Motor
- 6.1.4 Impeller No 616
- 6.1.5 50' Of Power Cable.

6.2 **The portable electric submersible trash pump specified in this section will be used to pump raw sludge and slurry.**

6.3 The pump and accessories shall be supplied by the pump manufacturer.

6.4 **The explosion proof pump offered shall be a manufacturer's standard production model. It shall have been in continuous use by municipal and industrial owners for a minimum of five years. A list of five user contacts including contact names and telephone numbers shall be provided with the bid submittal. Failure to supply a verifiable users list will be cause for rejection of the bid.**

6.13 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

6.14 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

6.15 DELIVERY:

Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 100 calendar days after receipt of a City of Houston Purchase Order.

6.16 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

7.0 GROUP I-BID LINE ITEM NO. 6: PUMP, 2" SUBMERSIBLE:  
Furnish 2" submersible pump(s).

**7.1 2" discharge, 11 HP Submersible Pumps, or approved equivalent to replace 10 ITT Flygt Pumps, Model MP-3127X, 3 inch discharge, 282 GPM @50' TDH, Explosion-Proof electric submersible cutter type pump, 3450 RPM.**

7.1.1 Pumps shall be complete with motors and all fittings, parts and modifications required for replacement of the existing sump pumps at the 69 Street Treatment Plant Facility.

7.2 PUMP PERFORMANCE:

7.2.1 Pump shall operate at 3450 RPM.

7.2.2 Pump shall be able to pump 150 GPM at 77' TDH.

7.2.3 Pump Impeller No. 212, or approved equivalent.

7.2.4 Pump shall operate under the same conditions as the original units they are replacing under all applicable conditions.

7.3 PHYSICAL CHARACTERISTICS OF THE PUMP:

7.3.1 Pump shall be constructed of metal or approved equivalent capable of withstanding conditions as typically experienced in a wastewater sludge pumping station.

7.3.2 Pump Impeller should have the high chrome impeller and wear plate adder or equivalent manufacture from a corrosion resistant material and coated with a corrosive resistant coating to prolong life and reduce wear.

7.3.3 Pump Impeller shall be dynamically balanced.

7.3.4 Pump shall be equipped with sufficient mounting mechanisms to allow connection onto existing pump mounts and supports.

7.3.5 Pump shall include discharge elbow and portable stand.

7.4 MOTOR:

7.4.1 Shall be 11 HP, 3-phase, 60-hertz, 230/460 volt, 3450 RPM rated for continuous duty in at least 40° C fluid.

7.4.2 Motor shall have NEMA PREMIUM electrical efficiency or equivalent.

7.4.3 Voltage tolerance shall be at least plus or minus 10%.

7.4.4 Power cable shall be sized according to NEC standards and shall be at least 50 feet long.

7.4.5 The motor and cable shall be capable of withstanding continuous submergence typical of sump pump operation of existing equipment without loss of integrity.

7.4.6 Motor horsepower shall be 6.5 hp or greater so the motor will not overload throughout the entire range of pump performance.

7.4.7 Motor and pump shall be on the same shaft.

7.4.8 Motor shall be fully compatible and be able to function as intended when connected to the existing switchgear for any of the existing sump pumps.

7.5 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

7.6 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

7.7 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 100 calendar days after receipt of a City of Houston Purchase Order.**

7.8 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

8.0 GROUP II-BID LINE ITEM NO. 7: PUMP, 4" NON-CLOG CENTRIFUGAL, 25 HP:  
Furnish 4" centrifugal pump(s).

- 8.1 **This specification covers two (2) ITT A-C vertical, non-clog, centrifugal pumps & motors. Pumps shall be ITT, Model NSWV, size 6x4x10LC. Pumps shall be rated for 695 GPM @ 78.5 feet when running 1755 RPM. Pumps shall match existing units dimensionally and allow for mounting on existing bases. The suction and discharge of the pumps when installed on the foundation shall be aligned with the discharge and suction piping**
- 8.2 PUMP CONSTRUCTION: Pumps shall be designed to perform satisfactorily with a reasonable service life when operated either continuously or intermittently in typical wastewater services. Pumps shall be mounted on pedestal bases and have fabricated steel motor.
- 8.2.1 Casing: Casing shall be close-grained cast iron ASTM A48 Class 30 of sufficient strength, weight and metal thickness to insure long life, accurate alignment, and reliable operation.
- 8.2.2 Volute shall have smooth fluid passages large enough at all points to pass any size solid which can pass through the impeller and provide smooth unobstructed flow.
- 8.2.3 A large clean-out opening with removable cover, having its interior surface matching the volute contour, shall be located on the casing at the impeller centerline, to allow access to interior of the impeller.
- 8.2.4 Casing shall be split perpendicular to the shaft, with removable suction cover and stuffing box cover. Machined fits for these parts shall be accurately aligned and identical so that casing may be installed for either clockwise or counter-clockwise direction of rotation.
- 8.2.5 Casing shall be arranged so that the impeller may be removed without disturbing either suction or discharge piping.
- 8.3 DISCHARGE FLANGE: Flange shall be ANSI 125-pound flat face (4"). All flanges shall have slotted bolt holes for ease of installation and removal. Each discharge nozzle shall be drilled and tapped with two 1.0" IPS taps, one on either side. One of the taps in the discharge shall serve as a vent.
- 8.4 DISCHARGE POSITION: Pump discharge nozzle orientation shall be tangential, centerline discharge is not acceptable, and shall be capable of rotation to any of eight discharge positions for each direction of rotation.
- 8.5 SUCTION COVER: Pump shall be manufactured with a removable suction cover to allow for access to the impeller. It shall be made of cast iron, ASTM A-48 Class 30. A 1/4" IPS tap shall be provided next to the suction flange. The suction flange shall be ANSI 125-pound flat face. Flange bolt holes shall be slotted for ease of assembly and disassembly. Pump shall be fitted with an increasing suction elbow with 6" connection and shall be provided with a tapped port for seal water return.
- 8.5.1 A replaceable 11.5%-14% chrome steel wear plate shall be furnished. It shall provide 1/4" minimum wear and shall be installed with its wear surface parallel to the end of the impeller inlet.
- 8.6 IMPELLER: Impeller shall be of the single-suction, enclosed type with two vanes, made of ductile Iron. Impellers shall be specially designed with smooth water passages to prevent clogging by stringy or fibrous materials, and shall be capable of passing solids having at least a sphere size of 3". Impeller shall be dynamically balanced. Impeller shall have a tapered bore and shall be keyed and secured to the shaft by an 18-8 Stainless Steel nut locked in place. It shall be readily removable without the use of special tools.
- 8.6.1 A replacement 11.5-14% chrome steel AL@ shaped wear ring shall be provided. Ring shall be mounted on impeller to provide a renewable surface opposite the suction cover wear plate.
- 8.6.2 Pump shall have provisions for adjustment of axial clearance. This adjustment shall be made through the use of shims placed between the frame and outboard bearing housing.

9.0 GROUP II-BID LINE ITEM NO. 8: PUMP, 6" HORIZONTAL:

**Furnish two 6x6 pump(s) specifically designed for pumping abrasive slurries. Pumps shall replace existing units without the need of piping or base modifications.**

- 9.1 PUMP PERFORMANCE - Each pump shall be designed for pumping at a capacity of Goulds model JC, size 6x6, s/n 435A312.
- 9.2 PUMP CONSTRUCTION
- 9.2.1 Casing Pump casing shall be of the end suction type and shall be constructed of cast iron. Double volute design shall be used to minimize radial. Casing shall be designed so that it may be rotated in the field to any of 8 discharge positions (45° increments) without special provision or exchange of parts. Discharge flange shall be 125 lb. ANSI standard.
- 9.2.2 Impeller Impeller shall be of the semi-open type constructed of 316SS; shall be threaded to the pump shaft (no shaft nut shall be used); and shall be statically balanced. Back vanes shall be incorporated to reduce stuffing box pressure. Impeller shroud shall contain no thrust balancing holes.
- 9.2.3 Rotation Pump rotation shall be clockwise when viewed from the driven end.
- 9.2.4 Suction Cover Suction cover shall be constructed of cast iron and shall be integrally cast with 125lb. ANSI standard flange. Cover shall be quickly removable for access to liner and impeller.
- 9.2.5 Suction Cover Liner Replaceable suction cover liner shall be clamped in place by the suction cover and shall be fully machined at casing fits. Suction Cover Liner shall be constructed of cast iron and shall contain no studs or tapped holes.
- 9.2.6 Stuffing Box Cover Stuffing box cover shall be constructed of HC600 and shall be designed with a machined, self-centering fit with the pump casing. Two tapped holes shall be provided for seal water connections (one or both may be used, depending upon application requirements).
- 9.2.7 Stuffing Box Pump shall be specially equipped with Goulds hydrodynamic seal.
- 9.2.8 Shaft Pump shaft shall be constructed of 316SS, with machined shoulders for bearing location.
- 9.2.9 Shaft Sleeve Shaft sleeve shall be constructed of 416SS and shall be of the "hooked" design, locked in place by the impeller with no other mechanical attachment.
- 9.2.10 Bearings Ball radial and thrust bearings shall be selected to provide a minimum B-10 life of 24,000 hours; shall be oil lubricated; and shall be protected by closures at each end and a slinger on the pump end.
- 9.2.11 Bearing Housing Bearings shall be fully enclosed by a single cast iron housing incorporating a seal water catch basin with a tapped drain and overflow ports.
- 9.2.12 Wear Adjustment Rotating assembly shall be readily adjustable by jack screws at the end of the bearing housing so that, as wear occurs, proper impeller-to-suction cover liner clearance can be maintained without dismantling the pump.
- 9.2.13 Testing - Pumps shall be hydrostatically tested in accordance with the Standards of the Hydraulic Institute.

10.0 GROUP II-BID LINE ITEM NO. 9: PUMP, 4" :

Furnish 12" non-clog centrifugal pump(s). Goulds 4x4-12 HSD Vertical Dry-Pit Hydro-Solids Pumps and all appurtenances called for herein. Pumps, bases, elbows, and motors shall match existing units. Alternate bids shall include the cost of installation including piping modifications and wiring modifications

10.1 Pump Performance - Each pump shall be designed for pumping at a capacity of 300 GPM and a total head of 30 feet. Shutoff head shall not be less than 33 feet, and maximum driven speed shall not exceed 880 RPM. Pump shall be of the recessed impeller type, designed to handle large solids and fibrous material without clogging, and shall be capable of passing any size solid that will enter suction inlet.

10.2 Pump Construction

10.2.1 Casing - The pump casing shall be constructed of HC600 Chromium Iron ASTM A532; Class III Type A and shall be a one-piece casting with integral suction and discharge nozzles. Both suction and discharge shall have 4 inch ANSI Class 125 flange connections. Casing shall be completely open from suction to discharge with all internal clearances being equal to I.D. of suction and discharge in order to permit the passage of any material that will enter suction inlet.

10.2.2 Casing - Wear Ring Periphery of casing adjacent to impeller shall be fitted with a replaceable wear ring constructed of Chromium Iron.

10.2.3 Impeller - The impeller shall be of the semi-open type, constructed of HC600 Chromium Iron ASTM A532; Class III Type A. Impeller shall be keyed to the shaft and held securely in place by a capped lock nut. An O-ring seal shall be provided between the lock nut and the impeller to protect the shaft from the liquid being pumped. Impeller shall be completely recessed so as not to impede the flow of solid particles in any way. Impeller rotation shall be clockwise when viewed from the driven end of the pump.

10.2.4 Stuffing Box Cover - The stuffing box cover shall be constructed of HC600 Chromium Iron ASTM A532; Class III Type A, shall be designed to provide a self-centering fit with the casing, and shall be of sufficient diameter to permit back pull-out of rotating element. The stuffing box cover shall contain a readily accessible stuffing box suitable for clear water sealing. The packing gland shall be constructed of Cast Iron and shall be of the split type.

10.2.5 Shaft and Shaft Sleeve - The shaft shall be constructed of high grade Carbon Steel suitably turned, ground and polished, and shall be protected from wear in the stuffing box area by a renewable 416SS shaft sleeve. Shaft sleeve shall be of the hooked type and shall be keyed to the shaft. An O-ring seal shall be provided between the shaft sleeve and the impeller hub to prevent leakage under the sleeve.

10.2.6 Bearings - Pump bearings shall be contained in a removable Cast Iron bearing housing. Housing shall be horizontally split for ease of maintenance. Both radial and thrust bearings shall be of the grease lubricated anti-friction type and shall be designed for B-10 life of 24,000 hours minimum.

10.2.7 Pump Support - The pump shall be supported by a one-piece cast base designed to permit use of a 4" suction elbow with handhole clean-out. Base shall be open on all four sides to provide for both 90 degree rotation of suction elbow and easy access to flange connections and handhole clean-out.

10.2.8 Pump Drive - Direct Connected Pump shall be designed for direct connection to a standard vertical solid shaft, normal thrust, 284 frame, 10HP, 230/460 Volt, 880 RPM motor with P base, Class F insulation w/Class B rise, 120 Volt space heater and shall be furnished complete with a suitable cast motor support and flexible coupling. Motor support shall be accurately positioned and bolted to pump frame to insure proper alignment of motor and pump shafts.

10.3 TESTING:

Pumps shall be hydrostatically tested in accordance with the Standards of the Hydraulic Institute.

10.4 **WARRANTY:**

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

10.5 **LITERATURE:**

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

10.6 **DELIVERY:**

Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 100 calendar days after receipt of a City of Houston Purchase Order.

10.7 **TRAINING:**

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

12.0 GROUP III-BID LINE ITEM NO. 11: PUMP, 4”:

Furnish vertical wasting pump(s).

12.1 Vendor shall provide the pumps and all fittings, parts and modifications required for replacement of the existing pumps at the 69 Street Treatment Plant. These will be coupled to existing 75 HP drives.

12.2 PUMP PERFORMANCE:

12.2.1 Pump shall operate at 572 RPM.

12.2.2 Pump shall be able to operate at 38.3' TDH.

12.2.3 Pump shall operate under the same conditions as the original units they are replacing under all applicable conditions.

12.3 PHYSICAL CHARACTERISTICS OF THE PUMP:

12.3.1 Pump shall be constructed of metal or approved equivalent capable of withstanding conditions as typically experienced in a wastewater sludge pumping station.

12.3.2 Pump Impeller shall be manufactured from a corrosion resistant material and coated with a corrosive resistant coating to prolong life and reduce wear.

12.3.3 Pump Impeller shall be dynamically balanced.

12.3.4 Pump shall be equipped with sufficient mounting mechanisms to allow connection onto existing pump mounts and supports.

12.4 **Reference Chicago Pump Type Vertical Pedestal Mounted (Model LMC4) Wasting Pumps, or approved equivalent to replace 300 GPM, Model No. LMC4, Serial No. 78-ZUS-8165-2, 572 RPM.**

12.5 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

12.6 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

12.7 DELIVERY:

Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 100 calendar days after receipt of a City of Houston Purchase Order.

12.8 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

13.0 GROUP III-BID LINE ITEM NO. 12: HORIZONTAL SLUDGE PUMP:  
Furnish submersible grind pump(s).

13.1 **Vendor shall provide the pumps and all fittings, parts and modifications required for replacement of the existing pumps at the 69 Street Treatment Plant Facility. These will be coupled to existing 7.5HP drives.**

13.2 **PUMP PERFORMANCE:**

13.3.1 **Pump shall operate at 875 RPM.**

13.3.2 Pump shall be able to operate at 30' TDH.

13.3.3 Pump shall operate under the same conditions as the original units they are replacing under all applicable conditions.

13.3 PHYSICAL CHARACTERISTICS OF THE PUMP:

13.3.1 Pump shall be constructed of metal or approved equivalent capable of withstanding conditions as typically experienced in a wastewater sludge pumping station.

13.3.2 Pump Impeller shall be manufactured from a corrosion resistant material and coated with a corrosive resistant coating to prolong life and reduce wear.

13.3.3 Pump Impeller shall be dynamically balanced.

13.3.4 Pump shall be equipped with sufficient mounting mechanisms to allow connection onto existing pump mounts and supports.

13.4 Reference Chicago Pump Type TSP (Model 4315SC-3D), or approved equivalent, to replace existing pumping equipment.

13.5 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

13.6 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

13.7 DELIVERY:

Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 100 calendar days after receipt of a City of Houston Purchase Order.

13.8 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

**16.0 GROUP V-BID LINE ITEM NO. 15: PUMP, SUBMERSIBLE, 153HP:**

**Furnish KRT Submersible Pump(s), 153 HP, 8,000 GPM, Cast Iron construction, Motor Version UN, XN, w/cooling jacket – installation type K.**

16.1 MATERIALS

- 16.1.1 Pump Case: Cast Iron, ASTM A48, Class 35B
- 16.1.2 Motor Housing: Cast Iron, ASTM A48, Class 35B
- 16.1.3 Impeller: Cast Iron, ASTM A48, class 35B
- 16.1.4 Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
- 16.1.5 Discharge Base Elbow: Cast Iron, ASTM A48, class 35B
- 16.1.6 Pump/Motor Shaft: Carbon Steel, C 45 N with replaceable ASTM A276 Type 420 shaft protection sleeve or entire shaft to be ASTM A276 Type 420 stainless steel with an ASTM A276 Type 420 shaft protection sleeve.
- 16.1.7 Shaft Sleeve: Stainless Steel, ASTM A276 Type 420
- 16.1.8 Wear Ring, case: Cast Iron SATM A48, minimum 200 Brinell
- 16.1.9 Wear Ring, impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell
- 16.1.10 O-Rings: Nitrate Rubber (NBR)
- 16.1.11 Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti
- 16.1.12 Lower Seal Faces: Silicon Carbide/Silicon Carbide
- 16.1.13 Upper Seal Faces: Silicon Carbide stationary/Carbon rotating
- 16.1.14 Guide rails/cables and mounting brackets: Stainless Steel, ASTM A276 Type 316 (cables shall be nylon coated)
- 16.1.15 Lifting Chain or cable: Stainless Steel, ASTM A276 Type 316
- 16.1.16 Oil-all uses(seal lubrication, etc): Ecologically safe, paraffin or mineral base
- 16.1.17 Power/Control Cable Jacket: Chloroprene with non-wicking fillers

16.2 ACCESSORIES

- 16.2.1 Power Cable
- 16.2.2 Temperature Protection
- 16.2.3 Seal leak detection
- 16.2.4 “PumpSafe” Motor Sensor Monitoring Relay

16.3 FABRICATION

- 16.3.1 General – Provide pumps capable of handling raw unscreened wastewater. Allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners.
- 16.3.2 Major Components (pump case, impeller, intermediate housing, motor housing)
- 16.3.3 Impeller and Wear Rings – single vane or multivane enclosed type
- 16.3.4 Shaft – Provide common pump/motor shaft of sufficient size to transmit full driver output with maximum deflection of 0.002 inches measured at the lower mechanical seal.
- 16.3.5 Shaft Seal
- 16.3.6 Bearings
- 16.3.7 Motor – housed in a completely watertight and air filled chamber, with a min 1.15 service factor.

16.4 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

16.5 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

16.6 DELIVERY:

Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 240 calendar days after receipt of a City of Houston Purchase Order.

16.7 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

**GROUP V-BID LINE ITEM NO. 16: PUMP, SUBMERSIBLE, ELECTRIC, 80HP:**

**Furnish KSB Submersible Pump(s), Model KRT, 80 HP, 20,000 GPM @ 20' TDH, 65' Shut off. Cast Iron Construction, Motor Version UN, XN, w/cooling jacket – installation type K.**

- 17.0 Identical replacement pump for the existing pump at Facility #190 to insure TCEQ required permits are met.
- 17.1 Pump will be used in the treatment plant to insure sanitary sewer is pumped properly to the plant for proper processing.
- 17.2 **Maximum motor HP: 80 HP**
- 17.3 **MATERIALS**
- 17.4.1 Pump Case: Cast Iron, ASTM A48, Class 35B
  - 17.4.2 Motor Housing: Cast Iron, ASTM A48, Class 35B
  - 17.4.3 Impeller: Cast Iron, ASTM A48, class 35B
  - 17.4.4 Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
  - 17.4.5 Discharge Base Elbow: Cast Iron, ASTM A48, class 35B
  - 17.4.6 Pump/Motor Shaft: Carbon Steel, C 45 N with replaceable ASTM A276 Type 420 shaft protection sleeve or entire shaft to be ASTM A276 Type 420 stainless steel with an ASTM A276 Type 420 shaft protection sleeve.
  - 17.4.7 Shaft Sleeve: Stainless Steel, ASTM A276 Type 420
  - 17.4.8 Wear Ring, case: Cast Iron SATM A48, minimum 200 Brinell
  - 17.4.9 Wear Ring, impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell
  - 17.4.10 O-Rings: Nitrate Rubber (NBR)
  - 17.4.11 Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti
  - 17.4.12 Lower Seal Faces: Silicon Carbide/Silicon Carbide
  - 17.4.13 Upper Seal Faces: Silicon Carbide stationary/Carbon rotating
  - 17.4.14 Guide rails/cables and mounting brackets: Stainless Steel, ASTM A276 Type 316 (cables shall be nylon coated)
  - 17.4.15 Lifting Chain or cable: Stainless Steel, ASTM A276 Type 316
  - 17.4.16 Oil-all uses(seal lubrication, etc): Ecologically safe, paraffin or mineral base
  - 17.4.17 Power/Control Cable Jacket: Chloroprene with non-wicking fillers
- 17.4 **ACCESSORIES**
- 17.5.1 Power Cable
  - 17.5.2 Temperature Protection
  - 17.5.3 Seal leak detection
  - 17.5.4 PumpSafe™ Motor Sensor Monitoring Relay
- 17.5 **FABRICATION**
- 17.6.1 Provide pumps capable of handling raw unscreened wastewater. Allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners.
  - 17.6.2 Major Components (pump case, impeller, intermediate housing, motor housing)
  - 17.6.3 Impeller and Wear Rings – single vane or multivane enclosed type
  - 17.6.4 Shaft – Provide common pump/motor shaft of sufficient size to transmit full driver output with maximum deflection of 0.002 inches measured at the lower mechanical seal.
  - 17.6.5 Shaft Seal
  - 17.6.6 Bearings
  - 17.6.7 Motor – housed in a completely watertight and air filled chamber, with a min 1.15 service factor.
- 17.6 **WARRANTY:**
- The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

17.7 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

17.8 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 180 calendar days after receipt of a City of Houston Purchase Order.**

17.9 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

18.0 **DELIVERY:**

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 120 calendar days after receipt of a City of Houston Purchase Order.**

18.1 **TRAINING:**

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

19.0 **GROUP V-BID LINE ITEM NO. 18: PUMP, SUBMERSIBLE, 330HP:**

**Furnish KSB Submersible Pump(s), Model KRT, 330 HP, 21,800 GPM @ 37.88' TDH. Cast Iron Construction, Motor Version UN, XN, w/cooling jacket – installation type K.**

19.1 This pump will be used in the treatment plant to insure sanitary sewer is pumped properly to the plant for proper processing.

19.2 Maximum motor HP: 330 HP

19.3 **MATERIALS**

- 19.3.1 Pump Case: Cast Iron, ASTM A48, Class 35B
- 19.3.2 Motor Housing: Cast Iron, ASTM A48, Class 35B
- 19.3.3 Impeller: Cast Iron, ASTM A48, class 35B
- 19.3.4 Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
- 19.3.5 Discharge Base Elbow: Cast Iron, ASTM A48, class 35B
- 19.3.6 Pump/Motor Shaft: Carbon Steel, C 45 N with replaceable ASTM A276 Type 420 shaft protection sleeve or entire shaft to be ASTM A276 Type 420 stainless steel with an ASTM A276 Type 420 shaft protection sleeve.
- 19.3.7 Shaft Sleeve: Stainless Steel, ASTM A276 Type 420
- 19.3.8 Wear Ring, case: Cast Iron SATM A48, minimum 200 Brinell
- 19.3.9 Wear Ring, impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell
- 19.3.10 O-Rings: Nitrate Rubber (NBR)
- 19.3.11 Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti
- 19.3.12 Lower Seal Faces: Silicon Carbide/Silicon Carbide
- 19.3.13 Upper Seal Faces: Silicon Carbide stationary/Carbon rotating
- 19.3.14 Guide rails/cables and mounting brackets: Stainless Steel, ASTM A276 Type 316 (cables shall be nylon coated)
- 19.3.15 Lifting Chain or cable: Stainless Steel, ASTM A276 Type 316
- 19.3.16 Oil-all uses(seal lubrication, etc): Ecologically safe, paraffin or mineral base
- 19.3.17 Power/Control Cable Jacket: Chloroprene with non-wicking fillers

19.4 **ACCESSORIES**

- 19.4.1 Power Cable
- 19.4.2 Temperature Protection
- 19.4.3 Seal leak detection
- 19.4.4 "PumpSafe" Motor Sensor Monitoring Relay

19.5 **FABRICATION**

- 19.5.1 General – Provide pumps capable of handling raw unscreened wastewater. Allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners.
- 19.5.2 Major Components (pump case, impeller, intermediate housing, motor housing)
- 19.5.3 Impeller and Wear Rings – single vane or multivane enclosed type
- 19.5.4 Shaft – Provide common pump/motor shaft of sufficient size to transmit full driver output with maximum deflection of 0.002 inches measured at the lower mechanical seal.
- 19.5.5 Shaft Seal
- 19.5.6 Bearings
- 19.5.7 Motor – housed in a completely watertight and air filled chamber, with a min 1.15 service factor.

19.6 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

19.7 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

19.8 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 240 calendar days after receipt of a City of Houston Purchase Order.**

19.9 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

20.0 **GROUP V-BID LINE ITEM NO. 19: PUMP, SUBMERSIBLE, 80 HP:**  
**Furnish KSB Submersible Pump(s), Model KRT, 80 HP, 3,060 GPM @ 60.5' TDH. Cast Iron Construction, Motor Version UN, XN, w/cooling jacket – installation type K.**

20.1 This pump will be used in the treatment plant to insure sanitary sewer is pumped properly to the plant for proper processing.

20.2 Maximum motor HP: 80 HP

20.3 **MATERIALS**

- 20.3.1 Pump Case: Cast Iron, ASTM A48, Class 35B
- 20.3.2 Motor Housing: Cast Iron, ASTM A48, Class 35B
- 20.3.3 Impeller: Cast Iron, ASTM A48, class 35B
- 20.3.4 Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
- 20.3.5 Discharge Base Elbow: Cast Iron, ASTM A48, class 35B
- 20.3.6 Pump/Motor Shaft: Carbon Steel, C 45 N with replaceable ASTM A276 Type 420 shaft protection sleeve or entire shaft to be ASTM A276 Type 420 stainless steel with an ASTM A276 Type 420 shaft protection sleeve.
- 20.3.7 Shaft Sleeve: Stainless Steel, ASTM A276 Type 420
- 20.3.8 Wear Ring, case: Cast Iron SATM A48, minimum 200 Brinell
- 20.3.9 Wear Ring, impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell
- 20.3.10 O-Rings: Nitrate Rubber (NBR)
- 20.3.11 Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti
- 20.3.12 Lower Seal Faces: Silicon Carbide/Silicon Carbide
- 20.3.13 Upper Seal Faces: Silicon Carbide stationary/Carbon rotating
- 20.3.14 Guide rails/cables and mounting brackets: Stainless Steel, ASTM A276 Type 316 (cables shall be nylon coated)
- 20.3.15 Lifting Chain or cable: Stainless Steel, ASTM A276 Type 316
- 20.3.16 Oil-all uses(seal lubrication, etc): Ecologically safe, paraffin or mineral base
- 20.3.17 Power/Control Cable Jacket: Chloroprene with non-wicking fillers

20.4 **ACCESSORIES**

- 20.4.1 Power Cable
- 20.4.2 Temperature Protection
- 20.4.3 Seal leak detection
- 20.4.4 “PumpSafe” Motor Sensor Monitoring Relay

20.5 **FABRICATION**

- 20.5.1 Pumps shall be capable of handling raw unscreened wastewater. Allow for removal and reinstallation without the need to enter the wet well and without removal of bolts, nuts or other fasteners.
- 20.5.2 Major Components (pump case, impeller, intermediate housing, motor housing)
- 20.5.3 Impeller and Wear Rings – single vane or multivane enclosed type
- 20.5.4 Shaft – Provide common pump/motor shaft of sufficient size to transmit full driver output with maximum deflection of 0.002 inches measured at the lower mechanical seal.
- 20.5.5 Shaft Seal
- 20.5.6 Bearings
- 20.5.7 Motor – housed in a completely watertight and air filled chamber, with a min 1.15 service factor.

20.6 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

20.7 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

20.8 DELIVERY:

**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 120 calendar days after receipt of a City of Houston Purchase Order.**

20.9 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

21.0 GROUP V-BID LINE ITEM NO. 20: PUMP, SUBMERSIBLE, 20HP:  
Furnish Submersible Pump(s), KSB Model KRT K100-251/164XG.

- 21.1 **Design: 2,500 GPM @ 63' TDH**
- 21.2 Minimum Shutoff Head: 15'
- 21.3 Maximum Motor HP: 20 HP
- 21.4 Minimum Hydraulic Efficiency (at design): 74.5%
- 21.5 Maximum Motor RPM: 1765 RPM
- 21.6 Pump Case: Cast Iron, ASTM A48, Class 35B
- 21.7 Motor Housing: Cast Iron, ASTM A48, Class 35B
- 21.8 Impeller: Cast Iron, ASTM A48, Class 35B
- 21.9 Wear Ring, case: Cast Iron, ASTM A48, and a minimum 200 Brinell
- 21.10 Wear Ring, impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell
- 21.11 O-Rings: Nitrile Rubber (NBR)
- 21.12 Lifting Chain or cable: 30' Stainless Steel chain, ASTM A276 Type 316
- 21.13 WARRANTY:  
The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.
- 21.14 LITERATURE:  
The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.
- 21.15 **DELIVERY:**  
**Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 140 calendar days after receipt of a City of Houston Purchase Order.**
- 21.16 TRAINING:  
A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

22.0 GROUP VI- BID LINE ITEM NO. 21: PUMP, 15HP:

Furnish FAIRBANKS MORSE 998425-0 TSP Pump(s) or approved equivalent to replace 2 Pumps, ITT ‘A-C’ Series NSW, Size 4x4x14, 15 HP, 400 GPM, 880 RPM, with dynamic seals and grease lube bearings, woods coupling fabricated steel base plate.

22.1 Pump shall be complete with motors and all fittings, parts and modifications required for replacement of the existing pumps at the 69 Street Treatment Plant.

22.2 PUMP PERFORMANCE:

22.2.1 Pump shall operate at 880 RPM.

22.2.2 Pump shall operate under the same conditions as the original units they are replacing under all applicable conditions.

22.3 PHYSICAL CHARACTERISTICS OF THE PUMP:

22.3.1 Pump shall be constructed of metal capable of withstanding conditions as typically experienced in a wastewater sludge pumping station.

22.3.2 Pump Impeller shall be manufactured from a corrosion resistant material and coated with a corrosive resistant coating to prolong life and reduce wear.

22.3.3 Pump Impeller shall be dynamically balanced.

22.3.4 Pump shall be equipped with sufficient mounting mechanisms to allow connection onto existing pump mounts and supports.

22.3.5 **Pump shall be equipped with "dynamic" seal system.**

22.4 WARRANTY:

Pump supplier(s) shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

22.5 LITERATURE:

Pump supplier(s) shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

22.6 DELIVERY:

Pump unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than 100 calendar days after receipt of a City of Houston Purchase Order.

22.7 TRAINING:

Pump supplier(s) shall provide a minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.

25.0 GROUP IX- BID LINE ITEMNO. 24: PUMP, SEWAGE, 5HP:  
Furnish PACO Centrifugal Pump(s) Model Number 52-49513.

25.1 **Referenced Equipment Manufacture: PACO Pump Model-52-49513, Size 4" X 4" X 9.5", CW rotation, no base.**

25.2 Design Conditions: 545 GPM @ 17-10 ft. TDH

25.3 Motor: 5HP @ 1150 RPM, S/N 9878030-101

25.4 Pump shall be fitted with impeller ASTM A48 Cast Iron is standard now for sewage.

25.5 WARRANTY:

The supplier shall provide a full one-year warranty on the pump, which includes parts and labor. The warranty work shall be conducted within three working days after receipt of written notice from the City. All shipping charges for warranty work that is required outside of the Houston area will be borne by the supplier.

25.6 LITERATURE:

The supplier shall provide two sets of operation, maintenance and parts manuals for each pump and hydraulic unit at the time of delivery.

25.7 DELIVERY:

Unit(s) as specified above, with delivery ticket and other documents and manuals, if requested shall be delivered to the location (s) as stated on each individual purchase order as expeditiously as possible, but no later than sixty (60) calendar days after receipt of a City of Houston Purchase Order.

25.8 TRAINING:

A minimum of four- (4) hours of training shall be conducted by the successful bidder. All training will be conducted at a City of Houston location to be determined at a later date.